

Definition

Flank pain is a sensation of discomfort, distress, or agony in the part of the body below the rib and above the ilium, generally beginning posteriorly or in the midaxillary line and resulting from the stimulation of specialized nerve endings upon distention of the ureter or renal capsule. Similar pain is sometimes caused by extraurinary abnormalities. Causes of flank pain are listed in Table 182.1.

Technique

The character of flank pain is very helpful in determining the cause. Important characteristics include local or referred pain, acute or chronic or recurrent pain, degree of severity, and duration. Associated symptoms such as fever, nausea and vomiting, and atrial fibrillation often help in making the correct diagnosis.

Flank pain that radiates to the ipsilateral testicle is usually caused by proximal ureteral or renal pelvic obstruction due

to the common innervation of the testicle and the renal pelvis (T11–12). This pain usually originates in the posterior part of the flank and radiates to the testicle of the male or the labia of the female. The pain becomes lower and more anterior in the flank when the obstruction occurs in the middle third of the ureter. The pain is still lower, radiates to the scrotal skin (rather than the testicle), and is associated with voiding symptoms such as urinary frequency and urgency when the obstruction occurs at the level of the ureterovesical junction.

The degree of severity of the pain is directly related to the acuteness of the obstruction rather than the degree of obstruction. Therefore, a stone that passes into the ureter and suddenly becomes lodged in one position usually causes extremely severe pain. But flank pain can be very mild or absent in the presence of very severe but chronic obstruction. Mild and chronic flank pain associated with severe ureteral obstruction can produce irreversible renal damage. A stone passing through the ureter will often cause severe but intermittent pain. The intermittent pain is related to obstruction produced when the stone becomes lodged in the ureter. Therefore, each episode of pain is likely to be associated with a stone becoming lodged in a new and more distal position in the ureter.

Flank pain is often associated with less specific symptoms including fever, nausea and vomiting, and tachycardia. Fever suggests infection proximal to the ureteral obstruction. Flank pain associated with fever requires a prompt diagnosis of ureteral obstruction and relief of the obstruction because infection proximal to the obstruction causes much more rapid renal damage than occurs with obstruction in the absence of infection. Also, the patient is susceptible to septicemia in the presence of infection proximal to a ureteral obstruction.

Gross or microscopic hematuria helps to confirm a urinary cause of the pain. Hematuria is occasionally absent with acute ureteral obstruction, however, and is often absent with chronic obstruction.

Although ureteral stone is the most common cause of flank pain, many other causes should be considered (see Table 182.1). Flank pain resulting from acute ureteral obstruction can also be caused by blood clots or sloughed renal papillae passing through the ureter. Blood clots can be produced by many pathologic lesions of the kidney, tumors being the most common cause. Renal papillary necrosis should be considered in patients with a history of analgesic abuse or diabetes mellitus.

Flank pain caused by chronic ureteral obstruction is generally much less severe. Occasionally, congenital anomalies such as ureteropelvic junction obstruction produce flank pain associated with a diuresis after oral intake of a large volume of fluid. Bilateral chronic ureteral obstruction or ureteral obstruction of a solitary kidney can be associated with symptoms of renal failure such as apathy, lethargy, anorexia, muscle twitching, headache, hypertension, and

Table 182.1
Causes of Flank Pain

Urinary

- Acute ureteral obstruction
 - Stone
 - Blood clot
 - Papillary necrosis
- Chronic ureteral obstruction
 - Congenital anomaly
 - Tumor
 - Stricture of ureter
 - Previous surgery
 - Radiation therapy
 - Retroperitoneal fibrosis
 - Stone
- Renal inflammation
 - Acute pyelonephritis
 - Perinephric abscess
- Renal tumor
 - Renal cell carcinoma
 - Transitional cell carcinoma
 - Wilms' tumor
- Trauma of kidney
- Renal infarction
- Vesicoureteral reflux

Extraurinary

- Gallbladder disease
- Appendicitis
- Diverticulitis
- Other gastrointestinal disease
- Chest disease
- Salpingitis

poor growth of a child. A dull or mild flank pain should make the clinician consider many possible causes including congenital ureteral obstruction, ureteral tumor or an extrinsic tumor compressing the ureter, acquired stricture of the ureter due to a previous operation or radiation therapy, retroperitoneal fibrosis, and a ureteral stone.

Flank pain caused by renal inflammation generally is not as sudden in onset or as severe as pain caused by acute ureteral obstruction. Renal inflammation usually produces localized pain and is associated with other manifestations of infection such as fever, leukocytosis, and bacteriuria.

Flank pain can be caused by different types of renal tumors, but pain is not the most common presenting symptom, and when pain is present, it often is associated with other symptoms. Hematuria is the most common symptom seen in tumors presenting in adults; an abdominal mass is the most common presenting symptom of Wilms' tumor in childhood.

Uncommon causes of flank pain include renal trauma, renal infarction, and vesicoureteral reflux even in the absence of infection. Renal infarction should be considered in patients with atrial fibrillation or a recent myocardial infarction. Vesicoureteral reflux occasionally causes mild flank pain due to distention of the ureter and renal pelvis when the reflux occurs while voiding.

A patient should be suspected of being an analgesic abuser when he or she presents with a history of acute severe flank pain, uric acid stones, previous reactions to contrast media, and a residence a great distance away. The physician should not be fooled by hematuria because narcotic addicts find ways to place blood in their urine specimens.

Extraordinary diseases of the abdomen and chest can also cause flank pain. These diseases produce pain less characteristic of the typical "renal colic" seen with acute ureteral obstruction. Nevertheless, this vague, dull, mild flank pain is similar to the pain seen with chronic ureteral obstruction, making the differential diagnosis unclear. The correct diagnosis is made by thinking of all the diseases that have been discussed, considering the associated symptoms, physical examination, urinalysis, and performing carefully selected laboratory tests and radiographic studies.

Basic Science

Flank pain originating in the urinary system is caused by distention of the ureter or renal pelvis or distention of the renal capsule. The severity of the pain is directly related to the rapidity of the distention and not to the degree of distention. Therefore, a patient with acute distention of the ureter will have extremely severe pain. This patient usually

has mild dilation of the ureter and no irreversible renal damage. However, a patient with a greatly dilated ureter and irreversible renal damage might have no pain or mild pain because the ureteral dilation has developed over a long period of time.

Distention of the renal capsule causes a milder flank pain. This can be caused by acute pyelonephritis, ureteral obstruction, or renal subcapsular hematoma.

Kidney and ureteral pain is through visceral afferent fibers that accompany the sympathetic nerves of the lower thoracic and upper lumbar segments.

Clinical Significance

Flank pain is the presenting symptom of many significant diseases of the urinary system. Ureteral obstruction should be recognized promptly, especially when it is associated with infection, in order to prevent renal damage. Progression of irreversible renal damage resulting from ureteral obstruction is related to many factors including the duration of obstruction, degree of obstruction, presence or absence of infection above the obstruction, preexisting renal function, status of the contralateral kidney, and age of the patient. An obstructed kidney has a greater potential for recovery if the contralateral kidney has diminished function; a younger patient has a greater chance of recovery of function than an older patient.

Radiographic evaluation of a patient with flank pain helps to diagnose the cause of the pain. The physician should consider all the diseases listed in Table 182.1 when a patient complains of flank pain. The diagnostic tests available to assess the urinary causes of flank pain are numerous, but are beyond the scope of this chapter. Some of the tests are intravenous urography, ultrasonography, computerized tomography, retrograde urography, diuretic renography, renal arteriography, and voiding cystourethrography. An efficient and cost-effective evaluation of flank pain can be done by carefully selecting the best diagnostic procedures based on a thorough history of the character of the flank pain and associated aspects of the patient's history.

References

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